Sources & Routes of Lead Exposure

On the following pages are brief descriptions of the commonly identified sources of lead exposure and the vehicles or routes by which they enter a child's body. It is important to remember that lead-based paint and varnish is the primary source of lead poisoning among children in Wisconsin and nationwide.

1. Source: Lead-based paint and varnish

Exposure to lead-based paint (LBP) is the major source of lead poisoning for children. When lead paint is intact, it is unlikely to cause exposure. The risk of exposure increases as the paint breaks down into smaller particles. The smaller the particles, the more easily they are dispersed, become accessible to children, and are absorbed by the body. If lead paint is allowed to deteriorate due to normal wear (moisture damage, temperature changes, friction, or impact), or when paint is deliberately disturbed by renovation activity, house dust and soil become contaminated. The resulting lead dust and chips can enter a child's body through normal hand-to-mouth activity.

Routes of Exposure:

- Lead dust created by deteriorating lead-based paint (LBP) or renovation activities can stick to fingers, toys, soil, food, and other accessible surfaces. Young children are then likely to ingest the lead dust through normal hand-to-mouth activity. This is the most common route of exposure for children.
- LBP is a hazard if it is peeling, chipping, chalking, or cracking. LBP that appears to be undisturbed can be a problem if it is on surfaces that rub together (friction surfaces) or surfaces that children chew, such as windows and window sills, doors and door frames, stairs, railings and banisters, porches, fences, and/or furniture.
- Surfaces that have been covered with new paint or another covering can expose layers of LBP if they are consistently rubbed, or when they become cracked or chipped.
- Lead in varnish is typically found on floors, door and window casing, trim and even old baby cribs.
- LBP that is intact, undisturbed, and inaccessible to young children may not pose a lead hazard and should be left alone.

2. Source: Industrial Source/Occupational

Industries that produce and/or use lead in manufacturing can create lead hazards. A list of industries identified with EBLLs among workers is listed in Figure 4.3. Short-term construction trade activity can also be a source of high dose exposure to LBP.

Figure 4.3

Industries Linked to Elevated Blood Lead Levels

secondary smelting/refining of nonferrous metals	storage batteries (lead batteries)
valve & pipe fittings (except plumber's brass goods)	brass foundry
plumbing fixture fittings & trim (brass goods)	glass products made of purchased glass
motor vehicle parts/accessories	firing range workers
pottery makers	chemical & chemical preparations
bridge, tunnel, & elevated highway construction	automotive repair shops
industrial machinery & equipment	inorganic pigments
primary batteries, dry & wet	

Source: Bader and Marion, 1990; Maizlish et al., 1990.

Routes of Exposure:

- Lead-emitting industries such as smelters and battery manufacturing plants can cause lead contamination of air, soil, and food grown in contaminated soil.
- Adults working in industries or other occupations involving exposure to lead may be directly exposed and/or may carry lead-contaminated dust on hair, clothing, and shoes home to their families.

3. Source: Hobbies

Hobbies that involve lead or lead containing materials (Figure 4.4) can cause exposure if steps are not taken to contain the lead and keep it away from children.

Figure 4.4

Hobbies Involving Lead Products

casting ammunition, fishing weights, or toy soldiers
soldering stained glass
making pottery and using lead glazes
refinishing furniture
using art supplies containing lead such as paints, glazes, or colored pencils

Source: Adapted from CDC Manual, 1991

Routes of Exposure:

- Eating, drinking, or smoking in the work area.
- Hands or clothes worn while working can become contaminated and expose children through contact. People involved in these hobbies are advised to avoid contact with children until they have showered and changed clothes.
- Lead contaminated dust from these hobbies can be spread to other areas of the home where children play or spend time.

4. Source: Toys, Children's Products and Other Household Products

In 1978, regulation of the commercial manufacturing of toys and children's products in the United States became more stringent for lead content. However, lead is periodically identified in products made in the United States or imported. Concern about the content of lead should be raised for toys imported from Southeast Asia, Central and South America, Eastern European countries, and Mexico.

Examples of widely used products that have been found to contain lead are candles with leaded wicks, vinyl mini and vertical blinds, and car keys. Any products built before 1978, such as toys, playground equipment and furniture, should be regarded as containing lead until tested.

If you would like current information on product recalls contact CPSC directly at 800-638-2772 or visit their web site, http://www.cpsc.gov. You can also contact the WI Dept. of Agriculture at (608) 224-4944 or visit their web site, http://datcp.state.wi.us/.

Routes of Exposure:
Mouthing, chewing, or ingesting dust or paint from products that contain lead.

5. Source: Traditional Home Remedies and Cosmetics

In some cultures, families may use remedies or cosmetics that contain lead (see Figure 5.5). Use of powder remedies containing lead for cosmetics or medical conditions is often steeped in traditions that may be unfamiliar to health care professionals in the U.S. It may take several interactions with the family to gain their trust and willingness to inform you of how, why, and which of these medicines or cosmetics they may use. If possible, obtain a sample of the suspected medicine or cosmetic to be analyzed for lead at the Wisconsin State Laboratory of Hygiene.

Figure 4.5

Traditional Home Remedies/Cosmetics Containing Lead		
Culture/use of product	*Name(s) of product*	*Description of product*
Latino: abdominal pain called "empacho"	Alarcon, azarcon, coral, greta, liga, rueda	Yellow or Orange powders
Asian Indian: intestinal disorders	Ghasard Bali goli Kandu	Brown powder Flat black bean Red powder
Hmong: fever or rash	Pay-loo-ah	Red powder
Arabian: cosmetic, treatment for infections of the skin or umbilical stump	Kohl or akohl Surma Ceruse	Powder

Route of Exposure:
Direct ingestion if taken as a medication or mouthing hand-to-mouth if topical application such as a cosmetic.

6. Source: Plumbing fixtures and pipes that contain lead

The most common source of contamination of drinking water is lead in plumbing solder. Contamination from lead pipes, lead connectors, and lead service lines is less frequent. Brass or bronze plumbing and well parts that have lead added to increase the malleability may be disguised by a chrome coating. The small wire mesh screen at the spigot end of the faucet can trap lead solder particles and contaminate the water. Where lead is present in plumbing, contamination is increased by corrosive water (acidic or low mineral content, "soft" water), the length of time the water sits in the pipes, and hot water.

Routes of Exposure:
Water that passes through lead containing plumbing fixtures or pipes can become contaminated and become a hazard when used in drinking, cooking, or food and formula preparation.

7. Source: Dishware

The lead content of commercial dishware, pottery and crystal manufactured in the U.S. is regulated. However, if these items are imported from countries without such regulation they may contain dangerous amounts of lead in glaze or glass. On occasion, the Consumer Product Safety Commission (CPSC) has recalled products that contain unsafe amounts of lead, such as imported ceramics and dishware.

If you would like more information on product recalls contact CPSC directly at 800-638-2772 or visit their web site, http://www.cpsc.gov. The State of Wisconsin, Department of Agriculture, Trade and Consumer Protection, also conducts product recalls and notices on unsafe products. You can contact the WI Dept. of Agriculture at (608) 224-4944 or visit their web site, http://badger.state.wi.us/agencies/datcp

Routes of Exposure:
- Ingestion of contaminated foods stored in dishes with leaded glaze or paint or leaded crystal.
- Acidic foods and beverages, such as tomato sauce, coffee, juice or wine can exacerbate the leaching of lead when prepared or stored in leaded containers.

8. Source: Lead-Based Solder in Cans

The lead solder used to seal cans may contaminate the food it contains. In 1995 the U.S. banned the use of lead solder in food or soft drink cans, but it is still used in many other countries and may still be found in cans imported to the U.S.

Routes of Exposure:
Ingestion by children of food or beverages stored in cans with lead-soldering.

9. Source: Leaded Gasoline

Leaded gasoline contributes directly to air lead levels. Fallout from the air causes contamination of soil, dust, and crops. Lead in soil does not biodegrade. Annual emissions of lead from gasoline have fallen dramatically since the mid-1970s, when the lead content of gasoline was regulated. The decline of lead in gasoline has been accompanied by a decline in the mean BLLs of the United States (U.S.) population. However, leaded gasoline is still used

in other countries, and children who are adopted or immigrate from these countries should be tested for lead poisoning.

Routes of Exposure:

- Exhaust from leaded gasoline stays in the top several inches of soil.
- Children playing on or in the soil may be exposed
- Food grown in contaminated soil may contain lead